DOCUMENT RESUME

ED 396 712 IR 017 924

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TITLE A Study of Project Management Techniques for Developing Interactive Multimedia Programs: A Practitioner's Perspective.
PUB DATE [Mar 96]
NOTE 31p.; Paper presented at the annual International Conference on Technology and Education (ICTE) (New Orleans, Louisiana, March, 1996).
PUB TYPE Information Analyses (070) -- Reports - Research/Technical (143)

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Computer Software Development; Designers; Evaluation Methods; Fund Raising; *Instructional Development; Interviews; Literature Reviews; *Management Systems; Marketing; Multimedia Materials; Proposal Writing
IDENTIFIERS *Project Management

ABSTRACT

Following a review of the literature, this paper reports on a study conducted with multimedia developers on their use of project management systems. The research questions that guided this study focused on whether multimedia developers use project management techniques; which kind they use; and which management techniques are of particular importance to multimedia development. Five project managers with different backgrounds were identified as successful. Based on an instructional development (ID) model described in the literature, project managers were interviewed on five aspects: (1) funding and proposal writing; (2) team assembly and management; (3) ID; (4) evaluation, marketing, and support; and (5) management. Findings show that the multimedia developers interviewed not only practice management techniques, but also regard project management as critical to the success of a project. The five components of ID management process were represented by the work of subjects. An appendix presents the interview questions as well as seven figures and tables illustrating: components of ID project management; types of proposals; features of successful proposals; techniques used by ID managers; and the phases of a typical multimedia project design process. (Contains 16 references.) (AEF)

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A Study of Project Management Techniques For Developing Interactive Multimedia Programs: A Practitioner's Perspective

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Abstract
(82 words)

The need for more effective information processing in the business and educational fields has created a market for multimedia technology. Many people are entering the field of multimedia software design and development. This paper reports a study conducted with several successful multimedia developers on their project management system. The strategy and techniques used by these practitioners are emphasized. It is intended to provide useful information on the project management process to those who are interested in becoming a manager of multimedia projects. (Keywords: project management, interactive multimedia, instructional development.)

INTRODUCTION

We are experiencing dramatic changes in all aspects of our life brought by the advancement of technology. Technology plays a prominent role in determining what we learn and how we learn. Technologies such as interactive multimedia and telecommunication have revolutionized information presentation and information construction. Multimedia has been defined as "still or motion video, text, graphics, audio, and animation controlled by a computer...It is a combination of hardware, software, and storage technologies incorporated to provide a multisensory information environment" (Galbreath, 1992, p.15). In addition to using multiple media sources, interactive multimedia is, more importantly, instructional, and intentionally designed to facilitate the communication between a user and the technology, and to enhance learning (Schwier & Misanchuk, 1993). Multimedia programs are numerous in the market. It is predicted that we will see a tremendous increase in multimedia CD titles and the market for multimedia looks good for the next several years (Lee, 1995).

As a result, the multimedia business has become increasingly attractive to people with a technology background. Graduates from instructional technology programs may find employment as instructional designers, technologists, or project managers in the field of multimedia. Although students at universities may gain a solid foundation in instructional design theories and technical skills in using technologies, the management processes for successfully producing a project are not always readily apparent or accessible to students (Gentry, 1994; Greer, 1992; McCormack, 1984). In a traditional university setting, opportunities to manage a large multimedia project are uncommon. Consequently, students often lack the knowledge as well as the experience, in the project management process and are not well-prepared for the job market in that respect.

To manage multimedia projects successfully, one should not only have a general knowledge of instructional development (ID) project management, but also should have a good understanding of the current practice by multimedia companies. This paper reports a descriptive study conducted with multimedia developers on their project management process. It is intended

to provide useful information on ID processes for those interested in multimedia project management.

REVIEW OF LITERATURE

Instructional development is "a systematic approach to the design, production, evaluation, and implementation of instruction" (Gentry, 1994, p.1). It is the process by which design theory and production skills are combined with project management to produce an instructional project. Over the years, a number of instructional development models have emerged, many of which are only different in specific steps of the ID process (Gentry, 1994). Two recent ID models are Greer's *ID Project Management Model* (1992) and Gentry's *Instructional Project Development and Management (IPDM)* model (1994).

Gentry pointed out that "Introductory ID textbooks tend to ignore or to treat inadequately the relationship between ID processes and their supporting processes" (p. ix). Her *IPDM* model underscores the needed "supporting" management processes for product development. Constantly assisted by vital supporting processes, the primary ID processes in Gentry's model include (1) production, (2) design, (3) adoption, (4) needs assessment, (5) evaluation, (6) operation, (7) installation, and (8) prototyping. She referred to the following as supporting processes: (1) management, (2) facilities, (3) personnel, (4) resource acquisition and allocation, (5) information handling, and (6) communication. Gentry's model is interactive in that the supporting processes are interrelated with and interdependent upon the primary processes. The importance of such supporting processes needs to be understood. She said that "development of instruction, whether done by a teacher, a trainer, or an instructional developer, requires project management skills" (p.5).

In his *ID Project Management Model*, Greer (1992) stated three phases of ID project management: project planning, instructional development and follow-up, and presented ten steps for accomplishing a project. According to Greer, the project planning phase consists of two steps: (1) determine project scope and (2) organize the project. The instructional development phase consists of five steps: (1) gather information, (2) develop the blueprint, (3) create draft materials,

(4) test draft materials, and (5) produce master materials. The follow-up phase has three steps: (1) reproduce, (2) distribute and (3) evaluate. These three phases and ten steps form a linear process for managing a development effort resulting in specific finished products.

The steps and techniques outlined in these models represent five components of an ID project management process: (1) funding and proposal writing; (2) team assembly and management; (3) instructional design; (4) evaluation, marketing, and support; and (5) management. The last component, management, is reiterative and interactive with each of the previous four components (see Figure 1). These five components are needed to develop a project from conceptualization to finished product.

Insert Figure 1 here

Funding and Proposal Writing

To develop a project, a company often needs to write a proposal to secure funds from outside sources or to win a bid on a contract. This process is referred to as grant writing (London, 1989). Each funding source has specific guidelines, deadlines, and procedures that must be followed. A developer (i.e. a project team) seeking private or public funding usually needs to develop its own ideas for a project. The proposal should present a good match to a funding agency's goal in order to be considered and funded. Companies that are seeking development groups to create their project, on the other hand, will develop a Request for Proposal (RFP), outlining all the necessary information required for developing the project (Greer, 1992). In this case, a need for developing the project has been established and potential developers should present a plan to meet the need.

Most proposals require highly developed budgets and timelines that use performance/budget matrices, PERT (Project Evaluation and Review Technique) networks, CPM (Critical Path Method) or some other formula for calculating how the project fits the time frame and budget proposed (Gentry, 1994; Greer, 1992; London, 1989; Moder, Phillips, & Davis,

1983). The budget information gathered from these methods generally needs to be presented in an easily readable format that clearly demonstrates costs while providing the funding agency flexibility for revisions (Gentry, 1994). Likewise, the timeline information gathered from these technical methods should be displayed in an easy-to-follow format.

Team Assembly and Management

A team must be assembled before a project begins. Usually in-house available staff are considered, before outside personnel is contacted (Gentry, 1994). Although Gentry concedes that the hiring of project personnel "is done less than systematically" (p. 338), it is still important to keep hiring guidelines in mind when seeking new personnel. Gentry outlines this process as follows: 1) write the job description; 2) announce the position; 3) interview the candidates; 4) negotiate with applicants; 5) make the offer; and 6) orient the new employee to the project environment (1994, p. 338).

After the team is assembled, a project manager is named. If the project is very large , sub-teams (such as instructional designers, artists, the programmers, the video team) are formed and each sub-team will be assigned a team leader. The tasks for a project should be broken down into the necessary skills and according to the timeline, and are associated with different sub-teams (Gentry, 1994; Moder et al., 1983). A project manager is expected to manage these different team members and facilitates communication among them.

Instructional design

Instructional design is a process of "determining and specifying objectives, strategies, techniques, and media for meeting instructional goals" (Gentry, p.59). Many instructional design models have come into existence over the years. Influencing early instructional design models were the computer programming models and behaviorist theories about learning (Dick & Carey, 1990; Ross et al., 1992; Stipek, 1993). Recently, the influence of the cognitive and constructivist viewpoints and the explosion in new information delivery technology are exerting significant influence on the models of instructional design (Ross, Sullivan, & Tennyson, 1992; Stipek, 1993; West, Farmer, & Wolff, 1991). According to Ross and others, "[t]he sophisticated delivery tools

available today provide powerful means for studying cognitive processes during learning and for adapting instruction to individual learner needs" (p. 6). Although the underlying assumptions of many design models are different, most instructional design models contain such critical elements as 1) setting objectives, 2) conducting needs assessment, 3) planning the instruction, 4) selecting strategies and materials, and 5) evaluating and revising.

Evaluation, Marketing and Support

Although essentially part of the design process, pilot testing and formative and/or summative evaluation are mentioned here as they are closely related to the finish of a product, and its marketing and distribution.

During the proposal stage, factors concerning marketing and distribution of the planned project must be considered. A profile of the target audience is important to the decision of how to approach the product. Typical types of information needed includes geographic, demographic, psychological, behavioristic, learner characteristics, and consumer expectations (Dick & Carey, 1990; Weiers, 1984). When a project is near completion, it is important to conduct formative evaluation. Formative evaluation is defined as "a series of evaluations...conducted to collect data that are used to identify how to improve it" (Dick & Carey, 1990, p. 6). Formative evaluation at the final stage should measure more than just the instructional criteria. It is important to ask questions that relate directly to the marketing and distribution of the product and incorporate pertinent findings (Gentry, 1994).

Management

Project management process consists of "the rational assessment of a situation and the systematic selection of goals and purposes (what is to be done?); the systematic development of strategies to achieve these goals; the marshaling of the required resources; the rational design, organization, direction, and control of the activities required to attain the selected purposes; and, finally the motivating and rewarding of people to do the work" (Levitt, 1976, as cited in Collins, 1983). It is a "process by which resources are controlled, coordinated, integrated, and allocated to accomplish project goals" (Gentry, p.233). The role of a project manager is more like a juggler.

He or she, though not directly involved in all the actions of a project, must be able to get each action started and keep it going (Greer, 1992, p.3). A project manager must be able to juggle among subject matter experts (SMEs), skills needed for the project, content, schedule, cost, media, facilities, and other resources (Greer). According to Greer, a project manager's job comprises three major activities 1) planning -- conceiving of the overall project and arranging for all project events to happen; 2) stimulating action -- getting each individual event started at the scheduled time; 3) intervening -- observing when things aren't going according to plan, then taking action to get things back on track (Greer, p. 4). An important factor for project management is to motivate and reward people to do the work. McCormack (1984) states that "business situations always come down to people situations" (p. 5). A manager's job is to motivate different talents to get the job done on time and solve any conflicts, if any, among team members.

In summary, the management of an ID process is a key to the success of a project. There are factors that an ID project manager must be familiar with in order to handle a large project effectively. These factors are:

- procuring funding for the project.
- applying instructional design principles.
- assembling a team and motivating every member to do his or her best for the project.
- understanding different technical aspects in order to communicate with different experts in a team.
- juggling time, cost, people and quality control.

The rapid development in technology creates a need for more multimedia materials. What is, however, the practice of multimedia developers in managing their projects? What management techniques do they use in developing multimedia programs?

PURPOSE OF THIS STUDY AND RESEARCH QUESTIONS

The purpose of this study is to find out which project management processes and techniques ID project managers must employ in developing multimedia programs, and to

describe the strategy and techniques used by some successful multimedia developers. The research questions that guided this study were (1) Do multimedia developers use project management techniques? (2) If so, what kind of project management techniques do they use? and (3) Are there any management techniques that are of particular importance to multimedia development?

METHOD

Interviews were conducted with successful project managers from a mid-size Southwestern city. This Southwestern city is known for its advancement in computer technologies and is active in promoting research and development of computer technology. It houses major companies such as Apple, Dell, IBM, Motorola, Texas Instruments, and small start-up computer companies. We sought to interview the project managers from those companies that produce instructional multimedia materials, rather than pure entertainment multimedia CD titles.

About the interviewees

Five successful project managers with different backgrounds were identified. A successful project manager was defined as one who had a reputation for developing instructionally sound, technology-based products that were produced at the budgeted cost and on time. Several of those interviewed had produced or contributed to award-winning multimedia projects. All of the interviewees were managing one or several instructional interactive multimedia project(s).

Of these five project managers, four were female and one was male. Two of the managers had master's degrees in instructional technology, one had a Ph.D. in instructional technology, and others had degrees and career experience in the fields of communication and video production. All of those interviewed had years of experience in designing and managing development of technology-based products, and all were managing one or several instructional interactive multimedia project(s). With these backgrounds, these managers were able to discuss management for multimedia projects from three different perspectives: 1) that of a well-known

educational technology company, 2) that of a large multimedia title publisher and distributor, and 3) that of a self-employed multimedia business.

Procedure

Based upon Gentry's and Greer's ID project management models, questions were developed in each of the five aspects as discussed above: (1) funding and proposal writing, (2) team assembly and management, (3) instructional design, (4) evaluation, marketing and support, and (5) management. Follow-up questions were asked as a result of the responses for clarification and further investigation on the topic. The questions used in this study were included here under the five topics (see Appendix).

Each interviewee was contacted by telephone, or in person to arrange for an interview. Permission was obtained from each interviewee to tape the interview. A time allotment was negotiated with each person based on their schedule and availability. The length of interviews varied from approximately an hour and half to two hours for a person, depending upon the availability of the interviewees. A total of 9.5 interview hours were conducted with these five managers.

At the beginning of each interview, the interviewees were informed that they would be asked questions concerning the various processes necessary to develop an idea into a marketable product. In addition to questions directed on their career background, job titles and responsibilities, all of the interviewees were asked to discuss the five components of the ID project management process. After the interviews, the tapes were transcribed, the interview data were analyzed, and the results were reviewed by the interviewed managers for accuracy.

FINDINGS

The interview results were summarized and discussed under the five project management components mentioned above.

Aspects of Successful Proposals

As a major means to obtain funds, proposal writing is a significant part for many multimedia companies. Project managers have to prepare, create, and collect hundreds of pieces

of data in order to present an outstanding proposal that is coherent, achievable, and convincing. All interviewed ID managers had experience in proposal writing and had obtained various types of grants or contracts. Some of them had written proposals to procure funds from private or public sources in order to develop a project. Others had written proposals submitted as a competitive bid in response to a Request for Proposal (RFP). Some had experience in writing both.

The major differences of writing these two types of proposals were discussed. Their respective characteristics and evaluation criteria were summarized (see Table 1). The interviewed managers elaborated on the features that contributed to successful proposals. Many of these features were common to both types of proposals and were listed in Table 2.

Insert Table 1 here

Insert Table 2 here

The interview data indicated that these managers spent a significant amount of time in writing proposals. All indicated that proposal writing was part of their job. Several pointed out that writing a proposal may require an investment of funds to conduct needs analyses or to hire subject matter experts and technicians to help brainstorm on how to present a vision of the product to a funding source. When seeking funding from a private or public source, a good proposal should demonstrate the need for the proposed project. Conducting a needs assessment is very important and should be a part of proposal writing process. "If you are seeking private or public funding, the needs assessment section needs to be very strong. You have to know the needs and you have to research justification, not just your opinion. It has to be researched." However, when the need is not an issue, that is, when there is a call for proposals (where presumably a need exists), a developer should conduct a needs assessment after the contract is

awarded, according to these managers. They considered needs assessment as a way to determine what tasks were really needed for the project.

Accurately estimating the cost to accomplish a task requires research as well as experience. The interviewed ID managers suggested using a performance/cost matrix or PERT chart for calculating the cost. A realistic and detailed timeline is very important, as is a plan for project management. These estimations can provide assurance to a client that the proposal is realistic.

Several managers mentioned that it was important to "pull out all the stops" to win a contract or funding and yet the project manager must be prepared to lose. Although proposal writing is a major activity, ID project managers must realize that the survival of the business or organization should not depend on winning just one contract bid. A good proposal should also be free of typographic errors. The managers who were in the position to award contracts to developers indicated that they would hesitate to give an educational project to a developer that did not appear to be detail-oriented or did not have the good sense to send the proposal out for proofreading, regardless of the developers reputation.

The experience of these interviewees showed that time available to put together a proposal, after the announcement of the deadline, was often very short. To cope with such a situation, experienced proposal writers made it a practice to keep track of yearly deadlines from funding agencies.

Team Assembly and Management

Many of the interviewed ID managers referred to the process of assembling and managing a development team as "an art and science." Their understanding and practice in team management revealed the following:

- Understanding the "languages" of various talents on a team is critical to the success of the project. This is especially true in managing a multimedia project. For example, artists will have special terms for their work (e.g. specs, render, mask); computer programmers will want to discuss information in terms to which they can relate (e.g.

variables, code); likewise subject matter experts have professional terms that relate to them. It is important for a project manager to develop an understanding of the technical language used by each of these team members.

- The importance of understanding and managing people cannot be underestimated. One manager commented that, "Most problems in a team are probably personalities...[you have to] be able to help people who are more shy to express their ideas and those with stronger personalities...pull back every now and then..." Another manager mentioned that an understanding of temperament types and their corresponding needs was helpful for managing teams. Issues of motivation, empowerment, and resolving disputes are very important to a project manager.
- Open discussion within the team and having members not to take the rejection of ideas personally is an important factor for a successful team. Project managers should help the team to understand that a quality project can only be accomplished by working together.

These ID managers discussed their practice in management and shared the techniques they used. The major techniques used in team assembly and management by these managers are summarized in Table 3.

Insert Table 3 here

Instructional Design

Several of these interviewed ID managers were or had been instructional designers in their careers. The discussion revealed that, though the design models they employed were consistent with the basic tenets of instructional design, each company used a slightly different approach. Two examples of the design process used by these managers are outlined here. The first approach has two phases: a design phase and a production phase, with each phase having concurrent processes in progress. Phase I of this approach shows a process that is controlled by

the instructional designers, who bring specialists and team members into the design process as consultants (see Figure 2). Phase II shows a process that is controlled by the production team, to whom the designers serve as consultants (see Figure 3). A project manager oversees the entire process and interacts with the lead instructional designer, the leader of the production team, and the individual team members. Another approach used is more concise. The steps are:

1. Take an inventory of what must be taught (content analysis).
2. Decide how the program should be structured based on the content.
3. Discuss which features should be included in the program to make it easy and accessible to the target audience.
4. Brainstorm on overall design, and interface.
5. Break the overall design plan into smaller tasks and assign tasks to teams.
6. Produce a design document that lays out the entire plan for the program including how to test, remediate and evaluate.
7. Flowchart the entire program in order to "see" the big picture, define the tasks, measure progress, and identify potential structural alternatives.
8. Develop a prototype for testing.

Insert Figure 2 here

Insert Figure 3 here

Regardless of approaches, a significant finding was that a key component of the design process was evaluation and revision. All the interviewees emphasized the importance of formative evaluation for their multimedia projects. They mentioned that they tried to engage in formative evaluation as much and as often as possible during the entire process. One interviewee

said that the key to good design was to "revise, revise, revise." Another interviewee sent all design components "out for review."

As for interface design, some considered it as only "one piece of the pie." Others regarded it of critical importance because it would affect people's decision to use the product or not. In terms of whether to use traditional programming languages or authoring languages for their projects, some said they still used traditional programming languages, while others preferred authoring languages to save time and money. However, all indicated that the knowledge of some programming languages was helpful, and in many cases, some original programming was needed.

Evaluation, Marketing and Support

Many of those interviewed believed that it was optimum to conduct formative evaluation during every stage of the instructional development process. ID project managers said that they usually had the pieces of the projects reviewed by team members, content specialists, and typical end-users. They emphasized the importance of getting feedback, whether it was during the drafting of a proposal, the content analysis, the prototyping, or the beta testing. In other words, for multimedia projects, evaluation was conducted on a continuous and frequent basis and conducted at most, if not all, stages of the project development. Revisions were made based on the feedback.

The managers mentioned that pilot testing was important. Sometimes a formal prototype was not included. In that case, extensive formative evaluation procedures should be used throughout the process. For these developers, formative evaluation was usually budgeted. However, they acknowledged that summative evaluation was rarely done in practice since it was very expensive.

Two of the interviewees discussed the importance of product support. One reported that support for their products was varied. It could be on-site training, 800 hotline numbers, on-line help, and/or print-based manuals. Because the target audience was different, the need of the support systems was different. For example, they mentioned that teenagers and young people

generally did not read print "help." In this case, an on-line help system was preferred. However, not everyone liked the on-line help according to some. Certain users preferred to pick-up the phone and call for help. Therefore, developing different kinds of help systems for different audiences was important.

In terms of marketing a product, the practice is different from company to company. Some developers marketed their own products or sold the marketing rights to a distribution source, while others were not concerned with marketing because they were hired to develop a project where presumably the need and marketing data had been established. Several said that during the proposal writing stage, they began to collect marketing data such as the characteristics of target audience, the sophistication of programs to which this audience was accustomed, the distribution channels, the number of units of the program, and the anticipated price. Such data was continually gathered during the evaluation stage, during which the need for demonstration disks and marketing literature was also determined.

Management

The data clearly indicated that good project management skills were essential to complete a quality project on time and on budget. The role of a project manager (i.e. what he or she should "know" and what they should "do") as reflected in the interviews are summarized in Table 4.

Insert Table 4 here

The findings showed that a manager must be able to break a huge task into smaller tasks that were easily managed by the team members. A project manager of ID must understand the technical jargon of the specialists on the team, and be able to manage and motivate them. A project manager must also have the big picture in mind at all times, orchestrating the team to reach the objectives of the project.

A staggered design process was a common practice with these interviewed. For example, the design team would start the design aspect of one project. When it was finished and handed over to the production team, the design team would begin a new project. For the project managers, they were usually managing several projects at any given time. Their schedules were often full. In addition, most managers were also designers, subject matter experts, or video producers. That is, these managers performed in other roles as well.

DISCUSSION

The findings of this study show that these multimedia developers not only practice management techniques, but also regard project management as critical to the success of a project. The importance of good project management skills was emphasized by all of the interviewees. Whether it is the management of a proposal, a team, the budget, or the design, project management is the central ingredient for success. This supports the literature which suggests that project management is the foundation of the development process (Gentry, 1994, Greer, 1992). Consistent with the literature that management is a highly organized process (Greer, 1992), these practitioners emphasized the importance of being organized. One interviewee said, "Be organized, be organized, be organized. That is all project management is, [to] be organized."

The five components of ID management process are well represented by the work of these practitioners. Their practice tells us that writing proposals and getting funding is a significant part of a manager's responsibility in today's competitive multimedia market. This is consistent with Gentry's and Greer's work. A project manager must develop the ability to write a good proposal that establishes a good match between the project's goal and a funding agency's needs (Rosen, 1995). Proposals with typographic errors and inconsistencies may unfavorably influence the reviewers. Typographical oversights can diminish reviewers' confidence in the ID manager's ability to perform to high standards. To avoid this situation, the interviewees recommended sending proposals (or any work for that matter) out for review and revision.

Part of a manager's job is to manage people. As indicated by these interviewees, managing people with different backgrounds can be a challenge. "Creativity is never conflict-free. Relationships among high-powered academicians, technicians, and artists are bound to produce disagreements and controversy" (O'Bryan, 1983, p. ix). To facilitate the communication among team members, a manager must be able to understand and speak the languages of the team members. The practice of these project managers also shows that the project manager is seldom an authority on the process. Rather, group consensus among team members is often a preferred practice. A factor, that is seldom found in any ID textbooks, but obvious from the practice of the interviewees, is that project managers sometimes have to deal with high-powered, opinionated people, make difficult decisions, and work against "ridiculous" timelines. Stress is often associated with being a manager and one should develop an ability to deal with job stress. It is also important to realize that there is rarely, if ever, any "down time," especially in today's competitive market. People who are to pursue this career should be prepared for this type of work environment.

It is interesting to point out that different companies often use slightly different approaches to instructional design, even though their approaches incorporate all the essential design elements. That is, each company has its own design model depending on its culture and practice. None used exactly the same as those outlined in the textbooks. For students who are to enter into multimedia development, it is not only important to have a solid foundation in one or two instructional design models, but also necessary to have a broad knowledge of various theories and current practice in design. Most of those interviewed insisted that the overall ID processes for multimedia programs were concurrent and interactive, as discussed by Gentry (1994). The interviewees also observed that within certain large tasks, a linear process of organization also took place as shown in Greer's model (1992).

An issue emerged from the interviews but not often discussed in the literature is product support. Research on which product support is needed for what type of audience tends to be

neglected during the entire development process. Yet, such knowledge could save a developer many hours designing a manual or an on-line help system that may never be used by the client.

What is most interesting of the findings is that all of the interviewed managers said that formative evaluation should be on-going, constant and not a single event. They emphasized, time and again, the importance of getting continuous feedback on their projects. Their practice illustrated that they spent the time and effort to have their products evaluated by internal, as well as external experts, at most stages of development. Although the importance of formative evaluation is discussed in the literature, it is usually an event that occurs near the end of the process. The constant evaluation, even at the expense of time and cost, seems to reflect the practice of these successful multimedia developers. A multimedia project is often complicated, and expensive. It uses many different types of expertise (i.e. graphic artists, programmers, video producers, instructional designers). In addition, today's computer market is extremely competitive and multimedia programs are numerous. Evaluation and feedback obviously can contribute to the quality of a product for it to stand out in a competitive market.

The practice of these managers have shown that the following have contributed to their success and are of particular importance for managing multimedia projects:

- An ID process for managing multimedia projects is interactive in nature. Evaluation is a critical part of all stages of the process. It is important to have continuous evaluation by in-house and outside experts to ensure the quality of a project.
- Juggling among factors such as resources, deadlines, and different areas of expertise in a multimedia project is especially challenging. A project manager should develop the ability to work with team members under the pressure of deadlines. A manager must be flexible, understandable, and always have the big picture in mind.
- The rapid change of technology requires a project manager to learn new tools, skills, and theories on a continual basis. A manager must be able to meet the challenge. In addition, a project manager should be willing to perform other roles (e.g. instructional designers, video producers) if needed. This is especially true for smaller multimedia companies.

In summary, this study described the practice, insights and suggestions of some successful multimedia developers in managing their projects. The findings indicate that effective management techniques are important to the overall success of an ID process. Project management techniques are used extensively by these practitioners.

For those who are to become managers of multimedia projects, acquiring a knowledge of project management is very important. New graduates should realize that a project manager's job is often very demanding and challenging. They would be better prepared by not only learning from textbooks, but by also seeking every possible opportunity to gain experience.

Contributors

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Appendix

Interview Questions

Topic: Funding & Proposal Writing

What are the major components of a winning proposal?

- Is your whole team involved in proposal writing?
- What steps need to be taken to get an interactive multimedia project funded?
- Are there private funding sources that will look at your "great idea?"
- What do you do with a proposal before you send it out?
- What do you do, as a developer, to make a good impression on the funding source?
- You have had success in winning bids; realistically, how many hours do you typically put into a proposal, and how much money do you invest in a proposal?
- From the point of view of a publishing/distribution source, what do you look at in a winning proposal?
- Is there anything else that you would like to mention about proposals that you think is important?
- How do you go about conducting a needs assessment?
- Do you conduct your own needs assessment studies or do you contract out this job?
- Is a needs analysis an important part of proposal writing?

Topic: Team assembly & management

How do you put together a good development team?

- What is essential in a good team? How do you help team members with different priorities (programmers, artists, SMEs) become united in their goal for a quality product? How does [contract] team building work in a business?
- How do you maintain a pool of available people to do your jobs?
- Do you have regular team meetings?
- What is the purpose of those meetings, to build vision or communicate work needs?
- Do many of these people [contract team members] ask you for an evaluation of their work?
- Are team building activities part of the cost of doing business?
- What role does an instructional designer play on the team?
- What are the pitfalls of any team?
- What are the things to watch for?
- What kind of attitude is necessary to function optimally with other designers and team members?

Topic: Instructional design

Would you tell me about the structure you use for the design process?

- Your bid had been accepted: How do you go about organizing the next step of the project? What are the components of a "design document?"
- Is interface design a big issue to you?
- Do developers have trouble with interface design?
- What language do your programmers use?
- Do you use authoring languages?
- Do you think adults and children have the same need for feedback in a program?

- What do you think are the keys to a good design?
- What do you do to go about implementing the design phase of the program?
- How important is it that all of your products are cross-platform, i.e. functional for both Mac and Windows?
- What is the first thing you do when you have a new project?
- When do you move on from goals/objectives to storyboarding?
- Who is the key contact with your SMEs?
- Do you keep a list of available SMEs?
- At what stage if ever do you develop a testable prototype?
- Is there any one phase of the design process that is really very difficult?
- Tell me about the final days of production. What are the issues?

Topic: Evaluation, marketing & support

How important is it to conduct formative evaluations during the various phases of your project?

- Do you feel it is worth all the money and delays?
- When do you test a prototype?
- When do you conduct a pilot test?
- Do you conduct a pilot test toward the end of the process and use formative evaluation to do a major rewrite?
- Have you ever faced the problem of having to do a major rewrite based on pilot test results?
- Do you handle the marketing, packaging, and distribution of your own product?
- How does a good product affect your bottom-line? Is multimedia curriculum profitable for you as a publisher?
- Do you integrate print and computer-based materials?
- Mention your thoughts about product support and help systems. Are you involved in the design of these items also?

Topic: Project Management

What does it take to be a project manager?

- I understand that the project lead and the project manager do not have to be the same person. What is your response?
- As a project manager, do you have many "fires" to put out?
- How do you prepare for the role of project manager?
- Do you think it is the instructional designer who should supply the vision for the program or can that come from the project manager?
- What are the major tasks of the project manager?
- As a project manager and business owner, what "other hats" do you have to wear that you wouldn't have to wear if you were an ID project manager in a company?
- As a title publisher, how patient are you with developer-originated project delays?

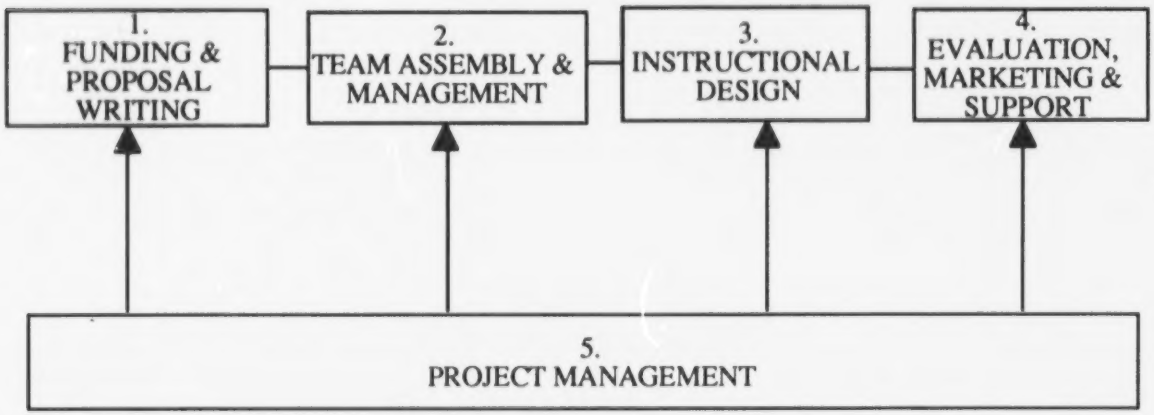

Figure 1. Five Essential Components of Instructional Development Project Management

Table 1

Two Types of Proposals and Their Evaluation Criteria

Characteristics of Good Proposals Submitted	Corresponding Evaluation Criteria
By Developers as Competitive Bids to a RFP	
• The proposal demonstrates financial stability of the developer.	• Will this company be able to handle cashflow needs for the duration of the project?
• When the client is sure of what it wants, the proposal should describe a detailed vision for the project that matches the client's wishes.	• Does the developer envision too much or too little of what we want?
• When the client has a more general need, the proposal presents a solution to meet that need.	• Does the developer provide me with a solid solution to meet my need?
• The developer sends a "thank you" letter and feedback form to any potential client who rejected the bid.	• Would this developer be appropriate for another project?
To Private/Public Funding Agencies	
• The proposal presents a good match between agency's and developer's goal.	• Does the developer's plan meet our specific criteria and goals?
• It presents a needs assessment.	• Does this proposal meet an existing need?
• It presents research on effectiveness of previous products.	• Will the Board of Directors be convinced that this product will provide results?
• It demonstrates the proposed project will have an impact.	• Will this product have an impact?
• It provides a marketing plan.	• How will the product be marketed, priced, distributed and supported?
• It presents an attractive project to the funding source.	• Does it propose an understandable product that meets the funding source's objectives?

Table 2

Features of Successful Proposals

Features Common to Both Types of Successful Proposals	Corresponding Evaluation Criteria by a Funding Source
• Well organized	• Is it neat and well organized?
• Well written	• Is it clear and well written?
• Free of spelling and grammatical errors	• Has it been proofed for spelling and grammatical errors?
• Detailed budget	• Does it contain a detailed, line-item budget?
• Detailed timeline	• Does it have a detailed timeline?
• Free of "technojargon"	• Does it contain too many technical terms that can confuse decision-makers?
• Thoroughly reviewed	• Does it seem coherent and thorough?
• Proven track record	• Does it demonstrate the project manager's ability to produce a quality project, on-time and on-budget ?
• Strong production team or partner	• Are the partners and/or development staff strong?
• Addressing all the criteria specified in the guideline	• Does it address all the criteria specified in the guideline?
• Detailed project management plan	• Does it contain a detailed project management plan?
• Clearly defined scope of the project	• Are the boundaries of the project clearly defined?

Table 3

Techniques Used by ID Managers

Categories	Description
Project manager's responsibilities to a team	• Have the big picture and final outcome in mind. • Know what kind of experts to hire. • Speak the "language" of the experts on the team. • Know how to keep people motivated. • Provide encouragement to team members who are working through frustrations. • Understand the design process (if the project manager is not an instructional designer). • Develop a plan for meeting deadlines. • Help the team develop a vision for the product. • Free the members from day to day management issues when possible.
Keys to Managing a Team	• Conduct team meetings and engage in regular communications. • Involve as many key players as is needed in meetings. • Allow for all team members to give input in meetings. • Understand time needs of members and the tools used by them (i.e. programmers, artists, video producers). • Conduct an occasional meeting in a special setting (such as a restaurant or retreat) to foster better team relationships, and build a united vision.
Finding Good Team Members	• Solicit and keep available stacks of resumés. • Network in appropriate social/business situations where these professionals may be found. • Evaluate potential team members by utilizing them in a small project first.
Keeping Good Team Members	• Employ good management and team building practices. • Practice good communications. • Honor commitments. • Be fair.
Characteristics of a Good Design and Production Team	• Members feel free to express opinions. • Rejection of ideas and constructive criticism are not taken personally. • The focus is on the project, not people or egos. • The quality of each member's work is excellent. • Members can get along with each other. • Members are good decision makers and can resolve crises on their own.

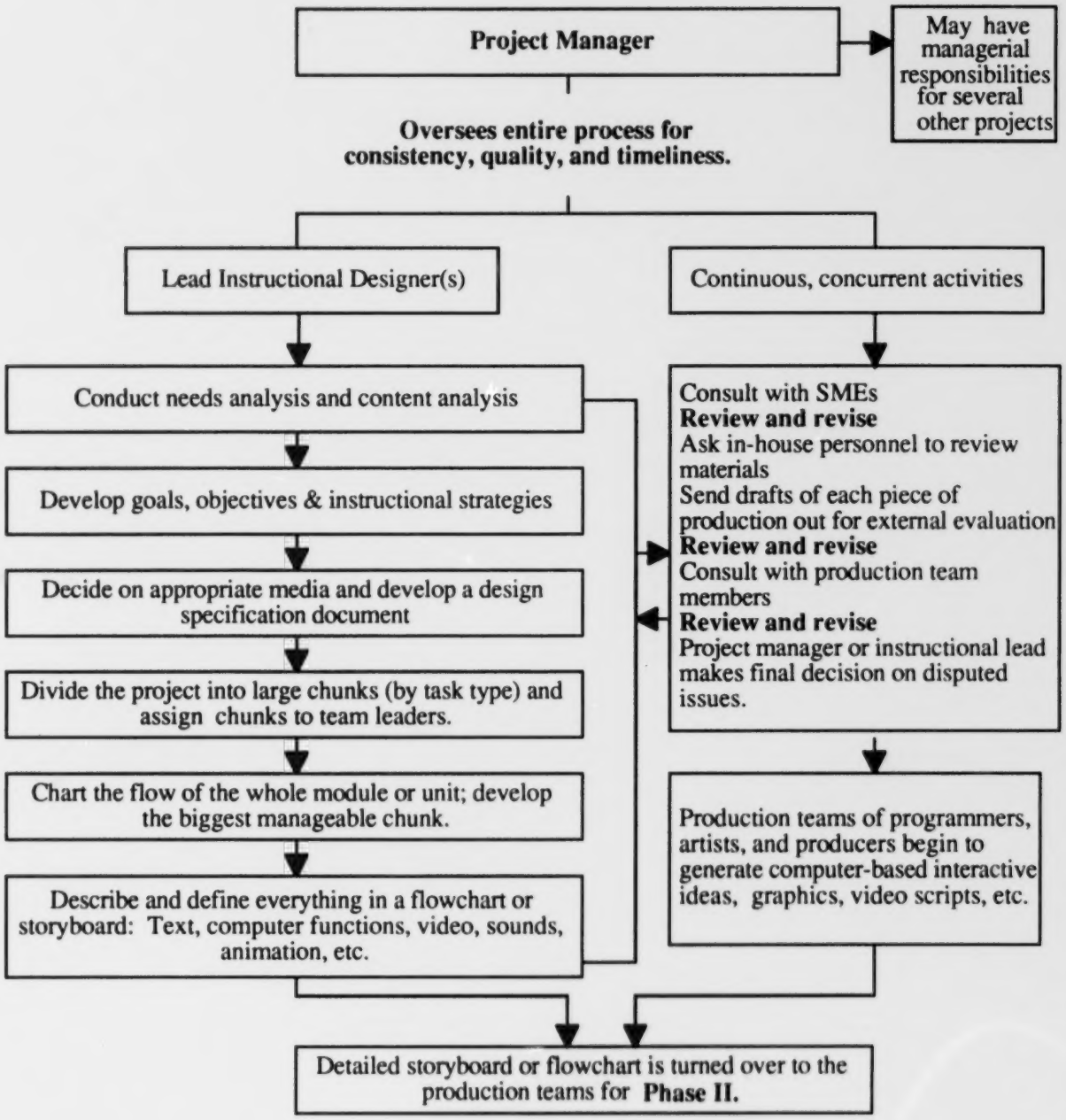
Project Manager
May have managerial responsibilities for several other projects
Oversees entire process for consistency, quality, and timeliness.
Lead Instructional Designer(s)
Continuous, concurrent activities
Conduct needs analysis and content analysis
Develop goals, objectives & instructional strategies
Decide on appropriate media and develop a design specification document
Divide the project into large chunks (by task type) and assign chunks to team leaders.
Chart the flow of the whole module or unit; develop the biggest manageable chunk.
Describe and define everything in a flowchart or storyboard: Text, computer functions, video, sounds, animation, etc.
Consult with SMEs
Review and revise
Ask in-house personnel to review materials
Send drafts of each piece of production out for external evaluation
Review and revise
Consult with production team members
Review and revise
Project manager or instructional lead makes final decision on disputed issues.
Production teams of programmers, artists, and producers begin to generate computer-based interactive ideas, graphics, video scripts, etc.
Detailed storyboard or flowchart is turned over to the production teams for Phase II.

Figure 2. Phase I of a typical multimedia project design process

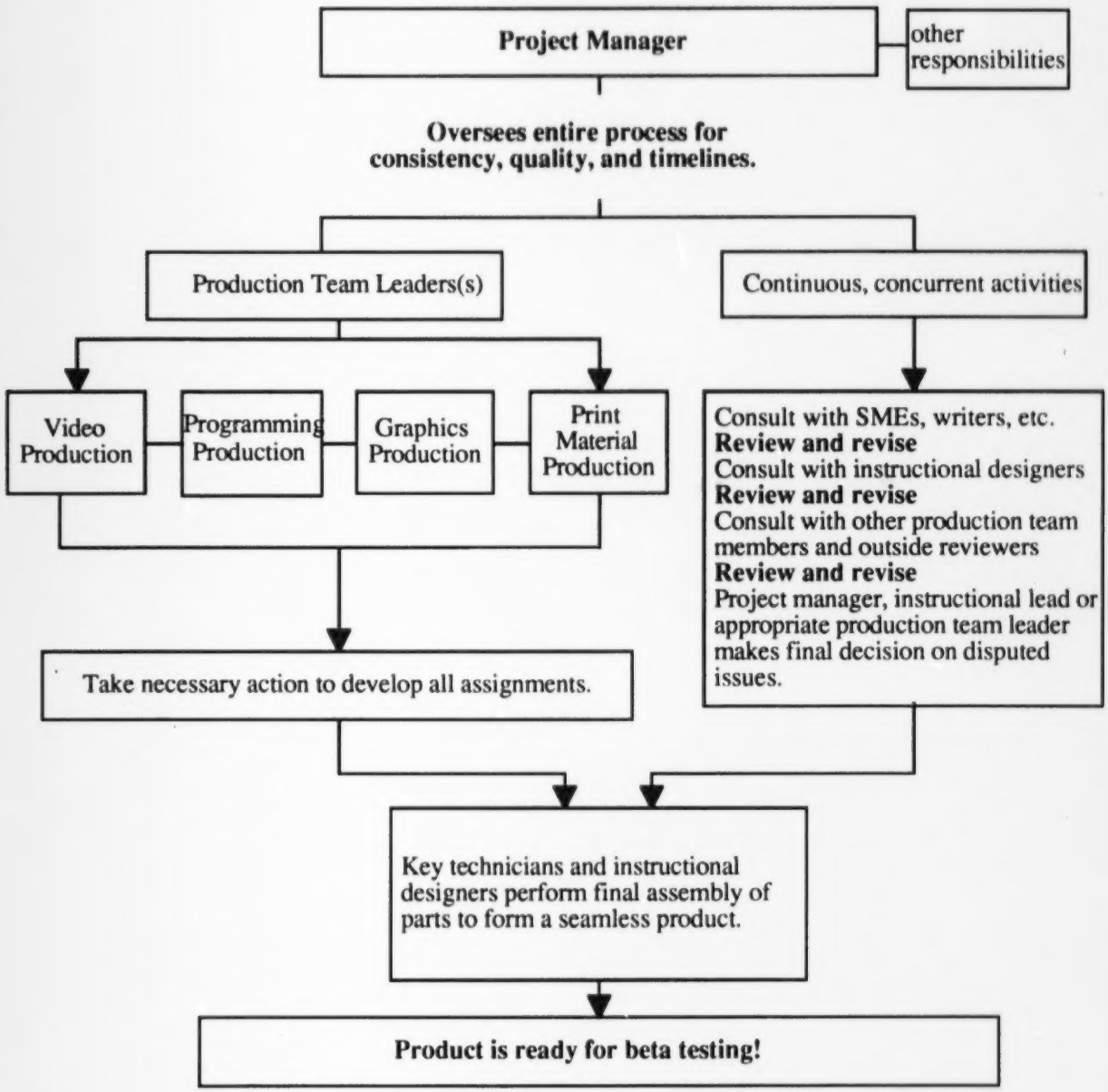
Project Manager
other responsibilities
Oversees entire process for consistency, quality, and timelines.
Production Team Leaders(s)
Continuous, concurrent activities
Video Production
Programming Production
Graphics Production
Print Material Production
Consult with SMEs, writers, etc.
Review and revise
Consult with instructional designers
Review and revise
Consult with other production team members and outside reviewers
Review and revise
Project manager, instructional lead or appropriate production team leader makes final decision on disputed issues.
Take necessary action to develop all assignments.
Key technicians and instructional designers perform final assembly of parts to form a seamless product.
Product is ready for beta testing!

Figure 3. Phase II of a typical multimedia project design process

Table 4

The Role of the Project Manager

Category	Description
What a project manager should know	• Know the big picture.
	• Know how to help members of a team make decisions on priorities.
	• Know how to manage crisis.
	• Know how to manage people.
	• Know the "languages" of the technicians, academicians, SMEs, and designers on the team.
	• Know how to motivate people.
	• Know how the different temperaments on the team work.
	• Know which types of people need "space" and which types need "structure."
What a project manager should do	• Write RFP's (Request for Proposal) in a language that the developer will understand.
	• Write proposals in a language that a funding agency will understand.
	• Free the team members or sub-team leaders from day-to-day management issues.
	• Evaluate the work the team created to ensure that it meets quality standards and is consistent with the other "pieces" being created.
	• Maintain client relations.
	• Keep the project very organized.
	• Maintain an even-handed attitude.
	• Break large, "seemingly impossible" projects into dozens or hundreds of little tasks to make them manageable for the team.
	• Keep the team on budget.
	• Keep the team on task, and on time.